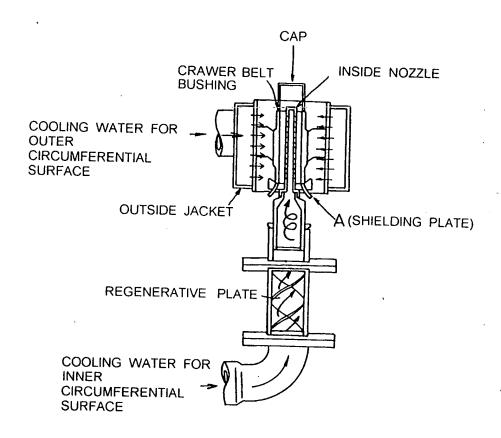
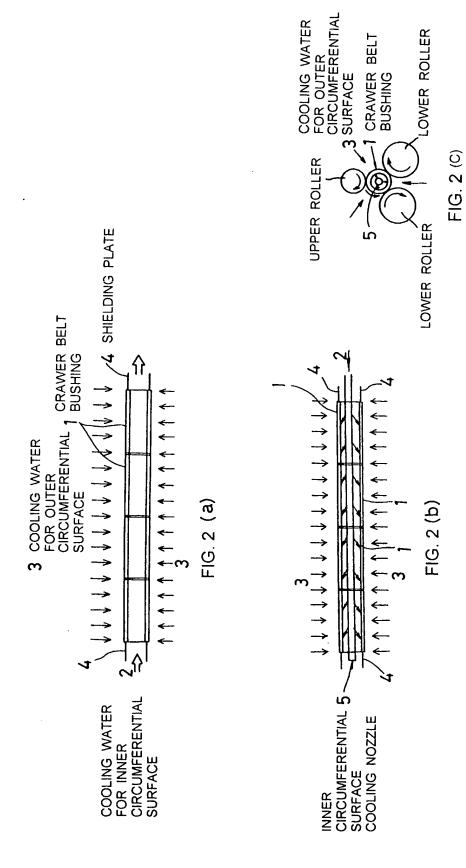
FIG.1





2

FIG.3

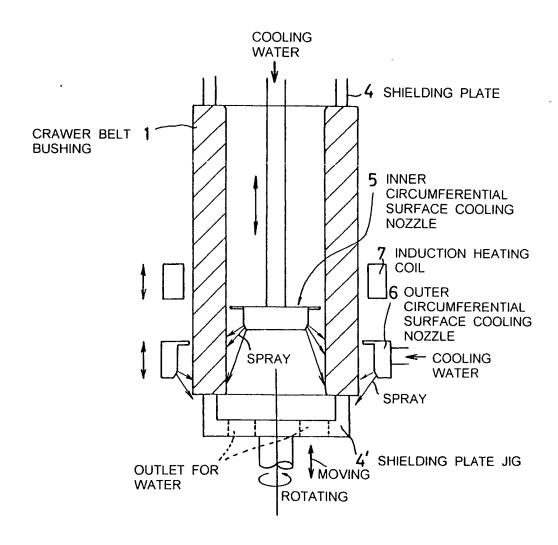


FIG.4

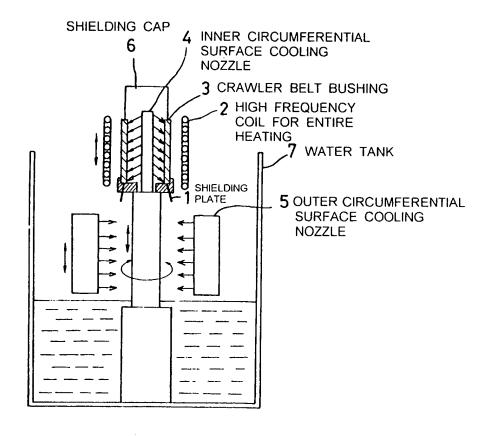
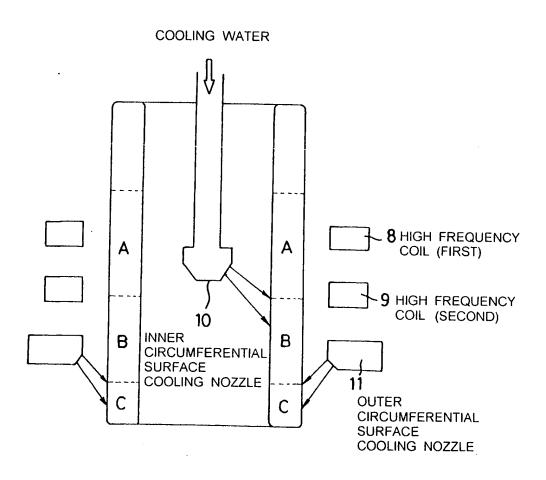


FIG. 5



A REGION: HEATING REGION

B REGION: INNER

CIRCUMFERENTIAL SURFACE COOLING OUTER

CIRCUMFERENTIAL SURFACE HEATING **COOLING REGION**

C REGION: INNER

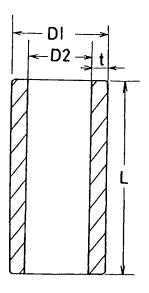
CIRCUMFERENTIAL

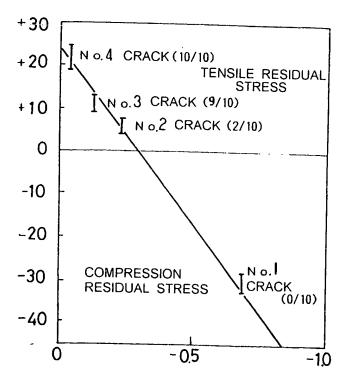
OUTER

CIRCUMFERENTIAL SURFACE COOLING SURFACE COOLING

REGION

FIG. 6





AVERAGE HARDNESS GRADUATION (x102 HV/mim)

FIG. 8

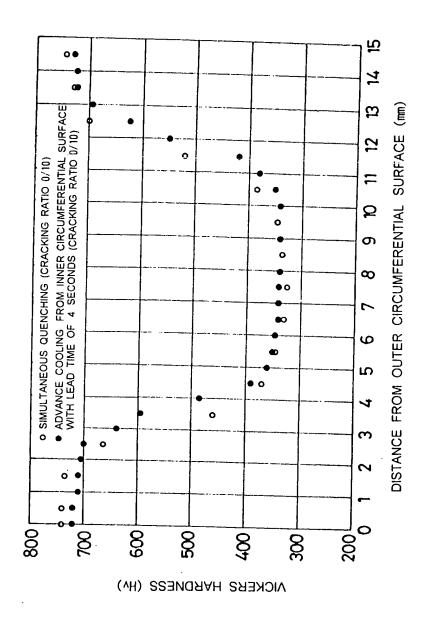
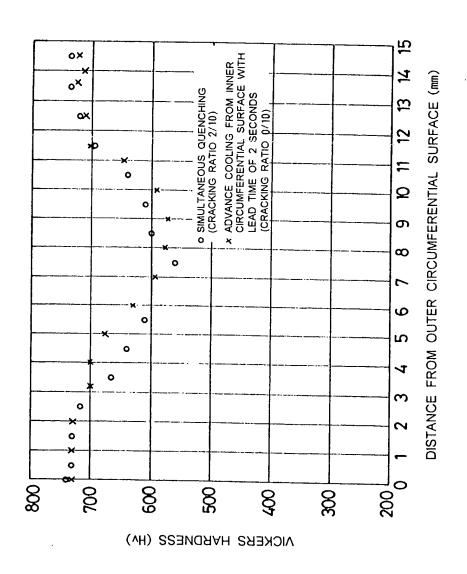


FIG. 9



9

FIG. 10

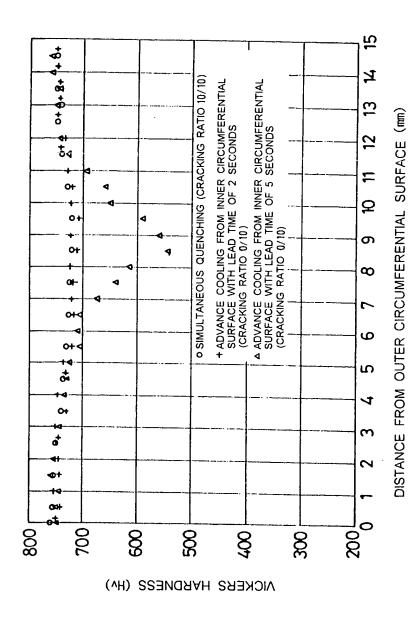
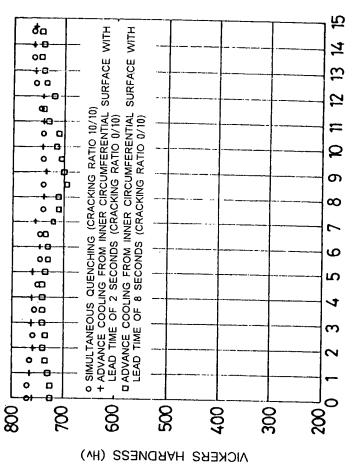


FIG. 11



DISTANCE FROM OUTER CIRCUMFERENTIAL SURFACE (mm)

FIG. 12

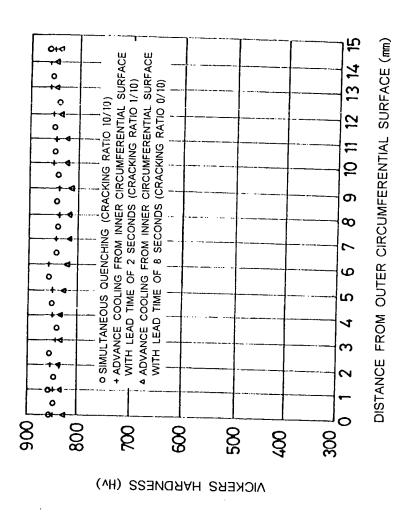


FIG. 13

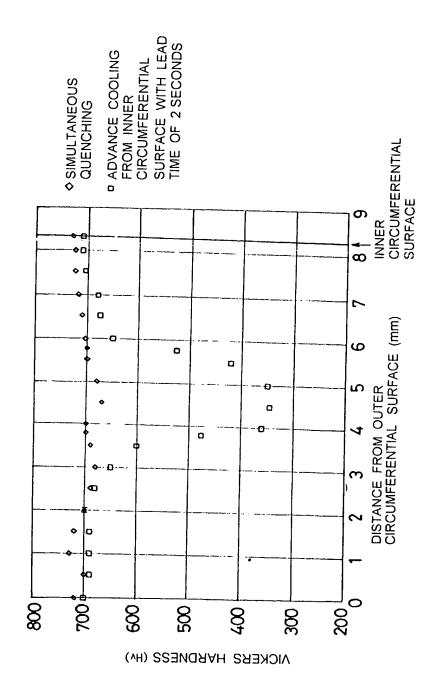
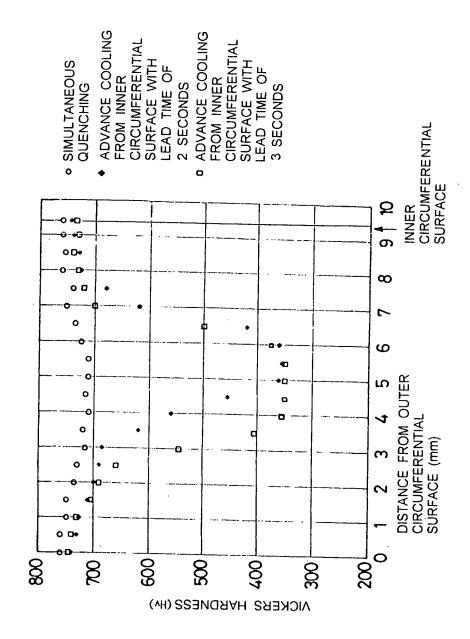


FIG. 14



ADVANCE COOLING
FROM INNER
CIRCUMFERENTIAL
SURFACE WITH LEAD
TIME OF 2 SECONDS (No.8)
ADVANCE COOLING
FROM INNER FIG. 15 ADVANCE COOLING FROM INNER CIRCUMFERENTIAL SURFACE WITH LEAD TIME OF 3 SECONDS (No.7) CIRCUMFERENTIAL SURFACE WITH LEAD TIME OF 3 SECONDS (No.1) QUENCHING (No.8) QUENCHING (No.7) SIMULTANEOUS SIMULTANEOUS INNER CIRCUMFERENTIAL SURFACE 2 თ ∞ 3 4 5 6 7
DISTANCE FROM OUTER
CIRCUMFERENTIAL
SURFACE (mm) ٥ Þ 0 ~ 0

රි

ğ

89

28

VICKERS HARDNESS (mm)

8

8

200

FIG. 16

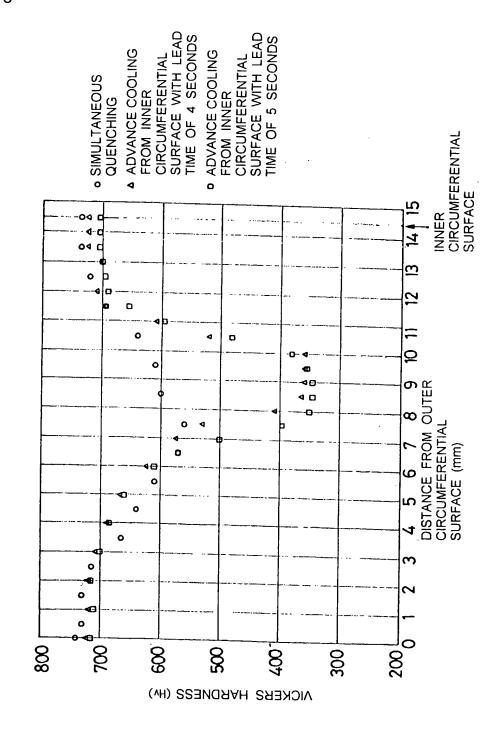


FIG. 17

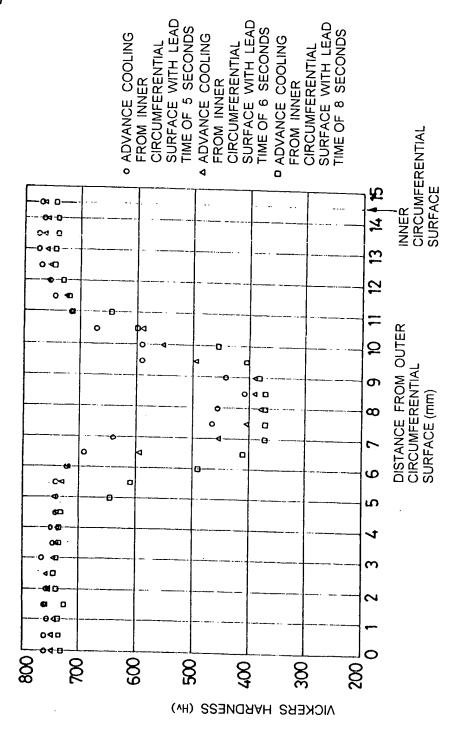
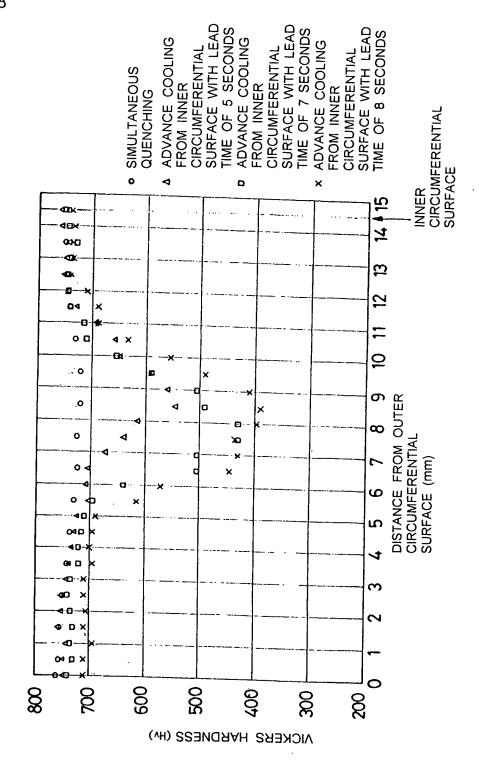
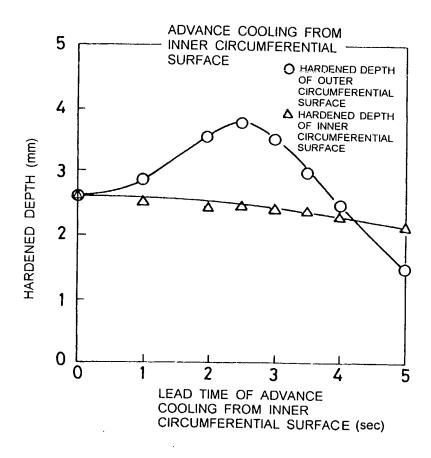
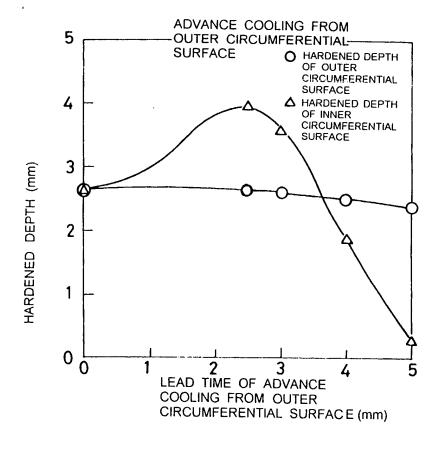


FIG. 18







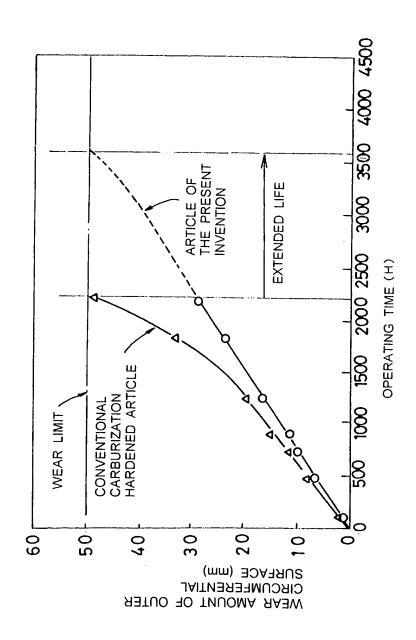
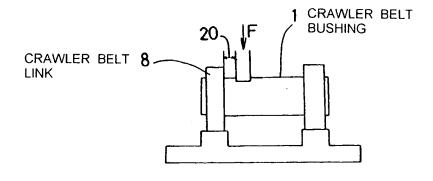


FIG. 22



 $F = 2 \sim 37.5$ TON, 2.5 Hz

O ARTICLE OF THE PRESENT INVENTION
(1) HAVING COMPOSITION NO. 8
(HARDENED DEPTH OF OUTER CIRCUMFERENTIAL SURFACE 4.5 - 5.0 mm, HARDENED DEPTH OF INNER CIRCUMFERENTIAL SURFACE 2.5mm)

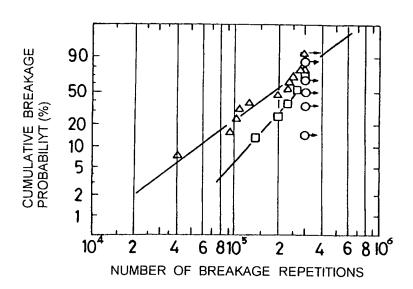
□ ARTICLE OF THE PRESENT INVENTION

(2) HAVING COPOSITION NO. 7

(HARDENED DEPTH OF OUTER CIRCUMFERENTIAL SURFACE 2.5mm,

HARDENED DEPTH OF INNER CIRCUMFERENTIAL SURFACE 2.5mm)

Δ CARBURIZATION HARDENED ARTICLE



1

FIG. 24

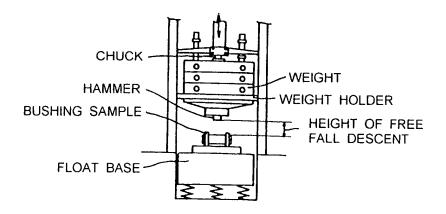
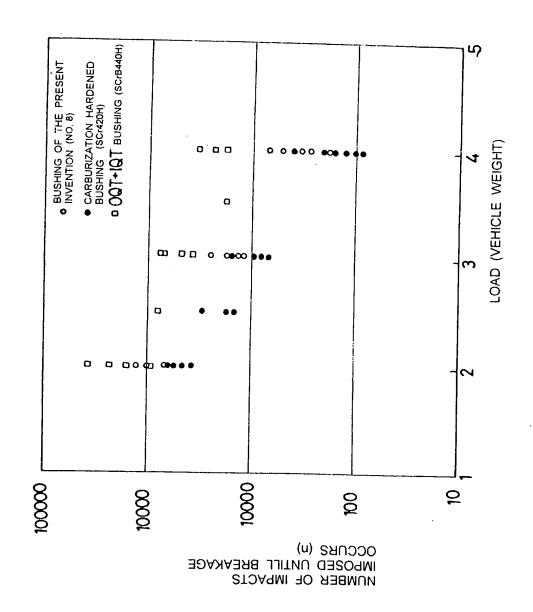
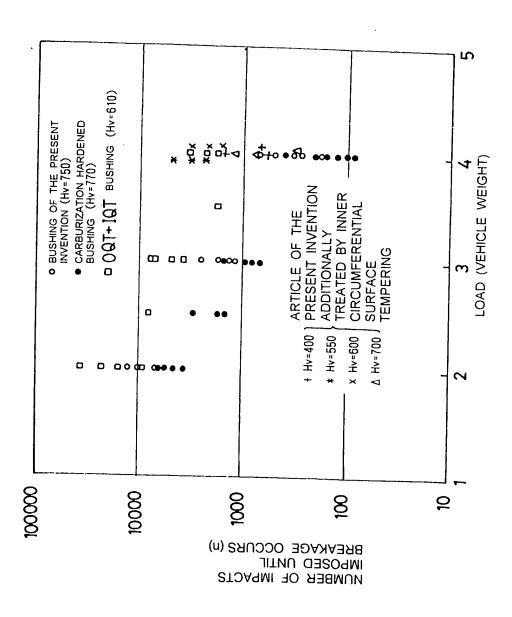
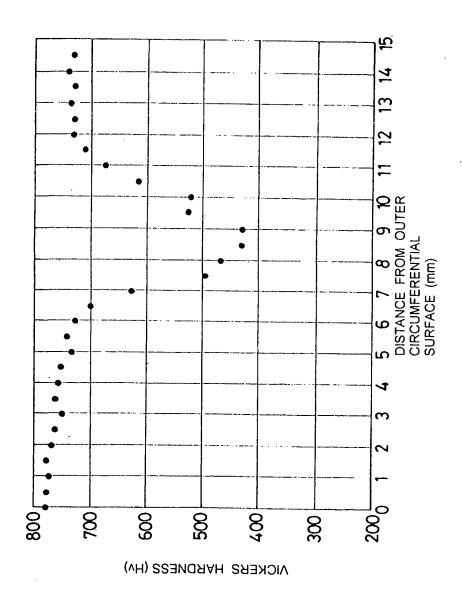
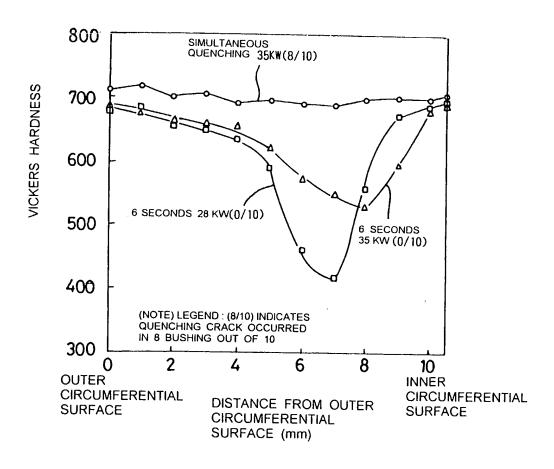


FIG. 25









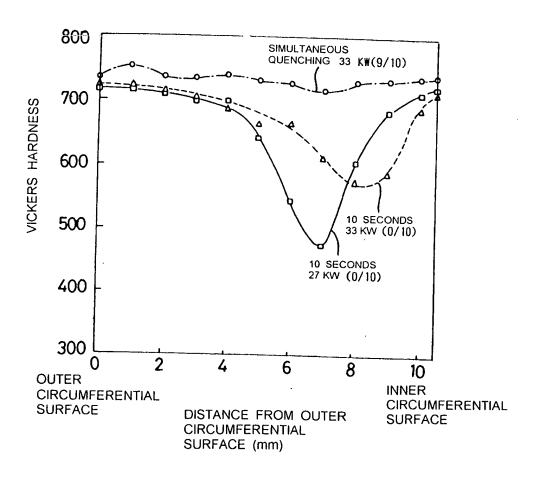


FIG. 30

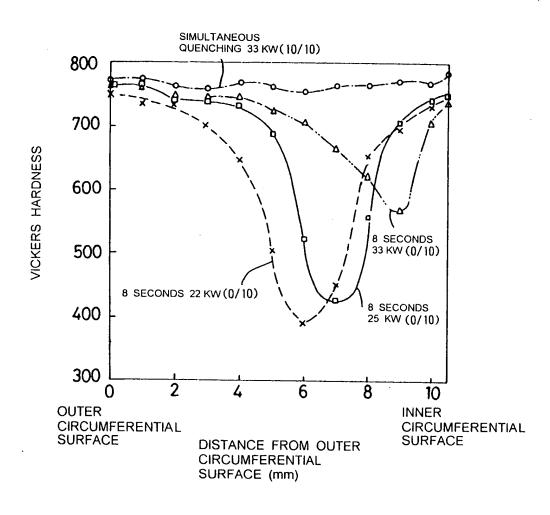


FIG. 31

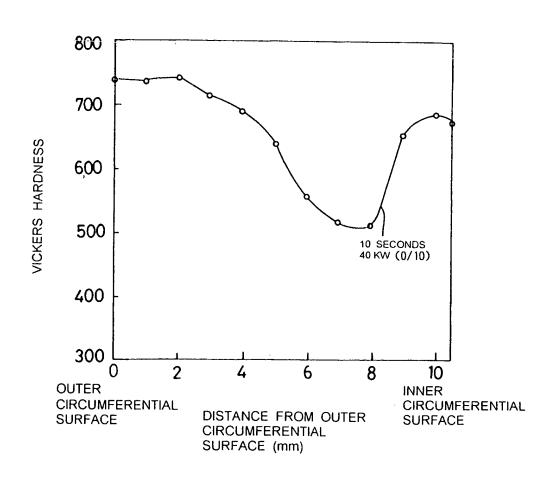
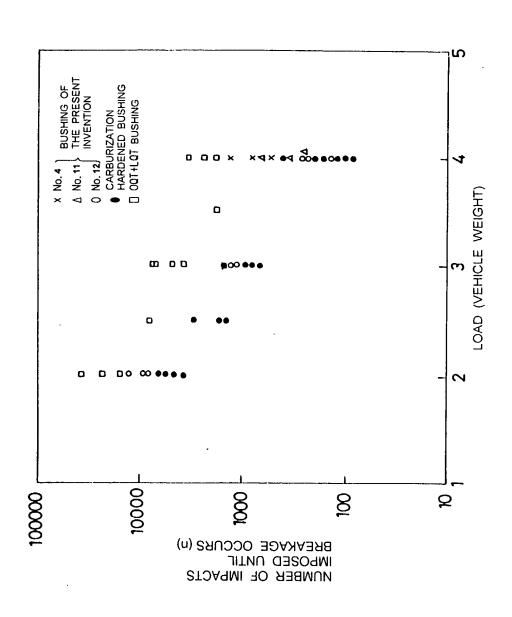
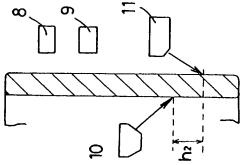


FIG. 33





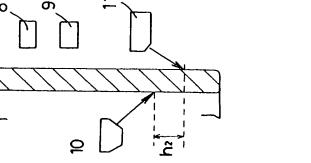
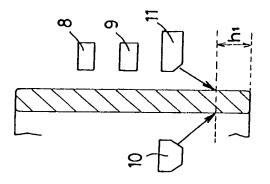
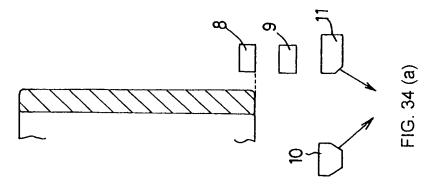
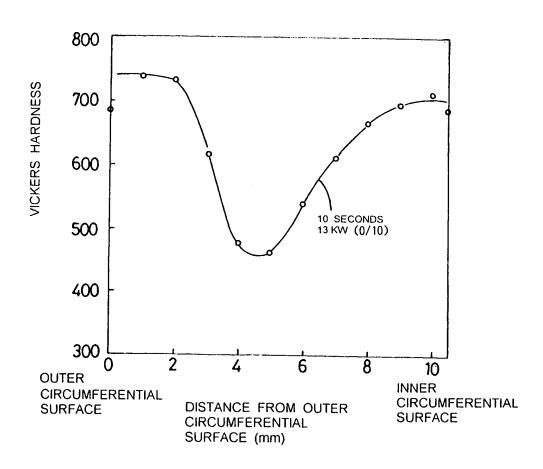


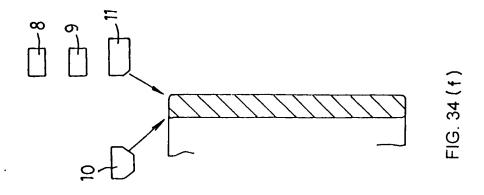
FIG. 34 (c)

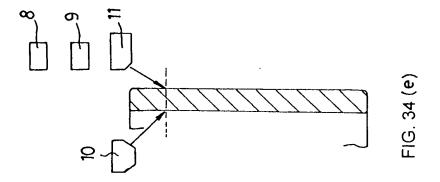
FIG. 34 (b)

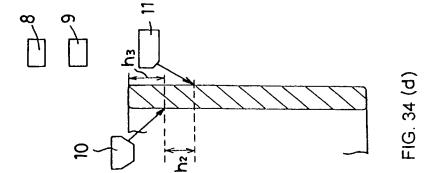












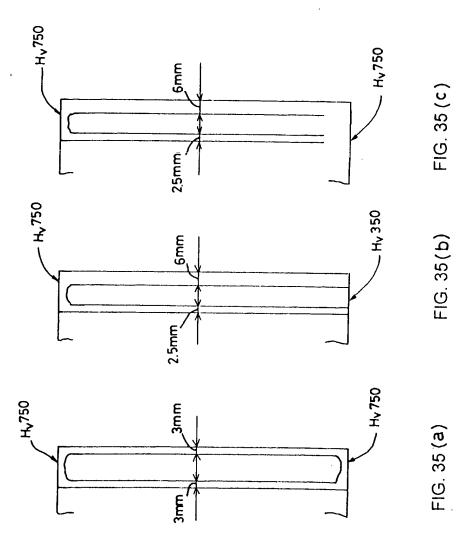


FIG. 36

